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REFERENCES

ON

GRAZING IN RELATION TO FIRE DAMAGE

IN FOUR PARTS UNDER -

- I Benefits,
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- IV Foreign and Miscellaneous,

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April 3, 1913

GRAZING IN RELATION TO FIRE DAMAGE

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References

Benefits

(Under this will be included also references which show neither positive or negative results of grazing or arguments showing burning to be incompatible with the grazing industry).

"On the Colville Forest 160,000 acres burned chiefly from surface fires. These point clearly to the value of proper utilization of range. Fires spread more than they would have if the land had been grazed and the aim of the Forest Service is to utilize the range. Concessions have been received from railroads etc. for transporting stock to new ranges."

Extract from recent Forest Service Press Bulletin.

Cattle grazing sometimes favors in a negative manner the growth of certain species which they do not eat.

"----have come to the definite conclusion that the only successful pervention of future big, uncontrollable fires in our Forests is grazing of livestock therein to the full capacity and especially by sheep."

How will sheep prevent fires caused by campers and lightning ? Sheep will keep down combustibile material."

Extracts from article "Sheep Grazing as Insurance Against Fire in National Forests" by Dan P. Smythe before the National Woolgrowers' Association, and published in the May number, 1911, of the National Woolgrower.

This article contains a great deal of good material.

Senator Warren in the Proceedings of the American Forest Congress, 1905, discusses sheep grazing and livestock grazing in general within the National Forests. He believes that still more liberality should be shown in granting privileges.

Fifteen years ago the setting of fires to clear the range was true, but since that time the danger has rapidly disappeared and the presence of stockmen within the Forests is a benefit rather than a hazard.

Filibert Roth, 1901, in his bulletin, "Grazing in the Forest Reserves", makes no reference to the effect of grazing on fire damage except to mention the charge attributed to herders of burning off the range. He does not seem to credit the charge very much.

"I have found sheep in almost every park in the mountains and I have examined most carefully through the timber surrounding the parks after they have been occupied by sheep in every part of the reserve and I have been unable to find the least evidence of the correctness of the belief 'that sheep browse on young trees and eat the bark'".

Extract from "Report on Bighorn Reserve, Wyoming," by F. E. Town.

Supervisor Blackhall's scheme for the Hayden National Forest, 1910, provides for keeping a fire line clear by driving sheep over it every year.

"The setting of fires to improve the range or to facilitate prospecting has been practically eliminated as far as the National Forests are concerned- - -."

"It has been shown by experience that cattle exist quite as well on an unburned range. In fact, many of the more intelligent stockmen have for some time opposed all burning - - -"

"Fire measures may be classified under three heads: Administrative, legislative, and educative. The aim of the second and third is to secure a more general adoption of the first."

Patrol, brush burning and judicious grazing most effective under administration.

"The fact should not be overlooked that judicious grazing in coniferous forests is a benefit rather than an injury. Not only does it not prevent reproduction, where the range is not overstocked, but it aids very materially in making it possible to protect the forest from damage by fire. "

"Where the range is not utilized, or incompletely so, a thick covering of dead grass accumulates on the ground, which burns readily, carrying the fire over large areas, destroying young growth, injuring middle-aged and mature timber, and setting fire to any inflammable material that may be within reach. Where there is a sufficient amount of dead timber on the ground to hold fire, the living trees are usually killed and partial or total loss of the property results. On the National Forests throughout the western States protection from fire has been most difficult on grazing lands which could not be utilized on account of lack of springs or streams for stock-watering purposes. A good example of the damage resulting indirectly from this condition is the Paulina Mountains fire, which burned from August 2 until August 23, 1908, in the Deschutes

National Forest, Oregon. There is no surface water in or near the vicinity; it has, therefore, not been possible to utilize the range, and as a result the ground was covered with a heavy covering of dead grass under growing vegetation. The cause of the fire is attributed to lightning. The region where the fire occurred is remote from the settlements and before help could be secured to fight the fire it had assumed great proportions, covering a front of 40 miles. It was 50 miles to the base of supplies and 16 miles to water. Men had to be brought distances varying from 50 to 150 miles----."

"The point, however, is that had the region been moderately grazed, the large amount of dry grass would not have been present on the ground, the fire could not have traveled as it did, and the damage would have been but a small fraction of that which actually occurred. An additional point is that where stock is grazed, the presence of men to care for them is required, and these men are invaluable in aiding the Forest Rangers and local residents, if there be any, in discovering and extinguishing fires before they gain headway. The development of water on dry ranges, in the form of wells or springs, and its retention in troughs or reservoirs, for the use of stock, would go a long way toward making possible the prevention and control of forest fires in remote and inaccessible regions. This is a strong argument in favor of the policy which the Forest Service

has adopted of developing the range as fast as the necessary funds can be made available."

Extracts from Clyde Leavitt's manuscript ,
"Forest Fires", 1908.

"Undoubtedly true, also, that the popular accusation of sheepmen as fire setters has acted as an effective warning to them. They realize that unless the reasons for this accusation are removed, there is a strong probability of their exclusion from the reserve, and this has led them both to be more careful with fires, and to insist publicly that they are careful-----".

Forest Service Bulletin No. 15, Colville, 1898.

"The statement is often heard among sheepherders that close grazing is a positive benefit to the Forests, because it prevents the spread of forest fires by the removal of the leaves and branches that later make up the dry, forest, litter. That the forests may be kept clean in this manner is unquestionable, but it is equally unquestionable that this means of preventing forest fires would prove very costly in the end. "

Forest Service Bulletin No. 15, Colville, 1898.

"The sheep in these reserves, (Mt. Rainier and Mt. Washington), refuse to browse conifers even under the most trying circumstances. Along trails and about bedding grounds of the older ranges, when everything else is nibbled, the conifers, even the cedars, remain entirely untouched-----".

"It appears then, that the direct injury done by the present sheep grazing consists in the trampling out of young plants. This destruction of young plants is not conspicuous in the woods, has not prevented many of the much-used ranges from coming up in pine, and on the whole has not made itself felt sufficiently to bring about any marked difference between the forest areas where sheep have grazed, and those where they have never been,-----!"

"Every locality has its own peculiar conditions, which determine the ease of starting, the spread, the whole behavior, and the final results of a forest fire--".

"Recent burns have been as numerous and extensive where no grazing is going on as where it is."

"Fires have been less numerous during the last six to ten years than before, - yet during this time sheep grazing on the dry side of the reserves has increased. -----it would seem fair to say that a more general grazing has not increased the number of fires."

"Improvement of sheep ranges by fire is not possible throughout these two reserves, except in the

yellow pine park woods. The old notion that grazing may be improved by burning is quite correct for certain regions, and for certain kinds of forests. (Instances of Florida and Georgia).-----".

"Sheep herder far less likely to cause fires than most people who travel about the mountains -- pretty good class of people -- large interests entrusted to his care. More danger from travelers and prospectors. 'Never was a fire left burning (sheepherders) which could have, under ordinary circumstances, found its way into the forest'. What was learned concerning the relation of sheepmen to fires points to the following conclusions:

1. The evidence on which the general accusations are based is as yet entirely unsatisfactory; it is generally hearsay if not altogether surmise, and is stimulated by adverse feeling.

2. Circumstantial evidence indicates that,-

- (a) Fires have been as frequent and as destructive in areas where no grazing takes place as they have been in the grazing districts.

- (b) The number of fires has decreased and not increased.

- (c) Fire can not improve the sheep range, but damages it.

- (d) Fire used to extend the range produces

uncertain results, requires a long time before it can possibly do any good, and is certain to spoil more or less of existing range, as well as to endanger the flocks.

(e) The herdsmen are more careful than most of the numerous transient campers in these mountains.

The charge that sheep harm some of the valuable forage plants by their excreta (which forms one of the most expensive fertilizers used by eastern florists), like the charge that sheep reduce the amount of game, is too puerile to deserve mention.

Fires and grazing have no established relation."

From unsigned manuscript on file in Grazing Office, Washington, D. C. about 190~~8~~⁷.

"My opinion is that more fires are caused by conditions without the reserve, and therefore beyond the jurisdiction of the Bureau.

With reference to the question of fires, I am inclined to think that laying the blame for them nowadays on the sheepmen is unfair, for I found that most owners I met and talked with were fully aware that apart from the fact that the benefit the sheep get out of it is questionable, the forest growth and particularly the young growth, must be protected. Unquestionably in the past

owners used to regularly fire a district when they had grazed it off; it was claimed that it burnt up all the trash and dead grass and that the young growth was stronger and better in consequence. However, it has been impossible to find out whether there is any truth in this or not, owing to the country having been persistently overgrazed, rendering it difficult to form conclusions, but it certainly is not practical now.

Came across only one place where fire had apparently been set for the reason of cleaning thickets, - burned in 1895, and 1901 was the first year it was possible to use it - five years elapsed."

Mr. T. Balfour's report, December 7, 1903, on the Washington and Rainier Reserves.

"From observations of timber areas which had been burned over during previous years it was evident that the effect upon the grass was very injurious and that it required several years for grass and other valuable forage crops to gain a footing after a fire. ---

Stock raisers were usually agreed that no advantage was to be derived in the way of increasing forage area for at least a long series of years, and that during this interval the amount of forage produced was much less than under forest conditions. These men were, therefore,

distinctly opposed to setting fires in timber or upon the range, with the idea of improving the range ----."

"At least two years required for range to recover from the bad effects of burning. Valuable weeds seldom recover from burning until after several years, if ever. -----"

"Fires are a distinct disadvantage to cattle grazing. Only set in chaparral ten years ago in California (NE). Once thought chaparral could be removed by burning and replaced by ferns and lupines but this belief has been outgrown."

Special report by E. V. Wilcox, "Grazing in the Forest Reserves Around Yellowstone Park and in the Adjacent Timbered Areas", 1901.

Mr. Gaskill in a letter dated November 10, 1899, to Mr. Pinchot, as a result of looking over some sheep ranges in the vicinity of Reno, Nevada, used for forty years, said: "In spite of the protests of those interested, that 'sheep do no harm to pine trees', it is evident that the forest is not what it might have been without the sheep-----."

"In how far the sheep are responsible for the scattered growth is a question; the opinion there is that the trees would not form thicker stands under any circumstances."

"Grazing diminishes the danger from fire in so far as it does away with a layer of combustible material over the surface, of sufficient thickness to cause fire to spread from any small or accidental source. In this way it tends to reduce the frequency of fires due to carelessness or from lightning and prevents very extensive spread of those due to maliciousness." -----

"Answering the question 'Do herders set fire to the forest in order to improve the range?' "

"In direct answer to this question I think it is safe to say 'No' not for this reason; if it is ever done it is a very rare occurrence nowadays. But they do set fire to it in one way and another, but generally the burning of the forest is a secondary rather than the primary result."

"Among the more illiterate class of Mexican herders there is a lingering belief in the idea that it is a good thing to burn off the dry grass, as they leave the mountains for the plains, so that there will be good feed in the region the season following. The better informed owners appreciate the fallacy of this idea and for this reason, as well as to avoid irritating the men who live in the mountains, have given their herders strict orders not to fire the forests."-----

"The only evidence in favor of the idea that sheepherders set fire to the range in order to improve it, is the statement (made by the cattlemen pretty generally),

that the fires most frequently break out about the time the sheep are leaving. This evidence is very poor, however, for no one has ever kept account of the fires, their times or places. or the relations of these to any given bunches of sheep."

"Cowmen do not hesitate to say that they set fire to the brush corrals made by sheepmen. It is also a standing joke as to how they "shoot up " the camp fires of the sheepherders. This is all done to drive the sheep off the range."-----

"The large cattlemen all appreciate the value of the dry grasses and underbrush and all insist that they always take pains to put out fires when they find them. The larger sheep owners expressed similar views, and said they had given their herders special orders to be careful about letting fire get away and to put it out whenever they found it."

"What areas are most often burned? Answer,- Those areas which are most thinly populated, being the higher peaks and ridges of the mountains and the very broken country lying along the eastern side of the main Mogollon Range."

"In the first place, I do not think that the prohibition of grazing would result in the true protection of the forest. As yet there is very little timber being

taken out of the reserves so the forest is valuable only as a preserver of moisture. The entire growth of vegetation would be valuable in this way as well, but this growth would **very** greatly increase the danger from fire. The only way to avoid the danger economically is to have people living in that region who are financially interested in not having forest fires on their ranges."

Mr. E. O. Worten, reporting upon the Gila Forest Reserve about 1900.

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References

Drawbacks

In the Southeast popular sentiment favors burning off the forest floors annually. Homesteaders and the cattlemen do this to keep down Black Jack and to improve the range. The turpentine burner burns in order to protect his trees from later burning. Burning takes place in December, January and February. The cattleman burns in March, April and May. Supervisor Eldredge advocates burning with protection and under control during winter months.

Extracts from "Fire Problems in Florida National Forest", Eldredge, "Proceedings, Society of American Foresters." 1911.

"Stock grazing is apparently a menace to the forests of the Southeast on account of burning off the lands to provide new feed."

Joseph Hyde Pratt, State Geologist of North Carolina. Recommends state-wide stock law, March 13, 1912,

which will compel owners to confine their stock to their own lands.

-----"I do not apprehend any direct injury to a forest from the grazing of sheep, as they do not eat the conifers and the amount of young coniferous saplings trampled out by them is not, I think, of material consequence; but a slope over which they have grazed and trampled is much more liable to erosion by the water of the melting snows of the following spring than during years from the operation of natural causes. This, however, is but a trifling injury compared with the irreparable damage resulting to the forests from the fires which follow the shepherd and his omnivorous band as constantly as foam follows in the wake of a steamer at full speed.

Martin W. Gorman, Geological Survey 1898, in reporting upon the eastern part of the Washington Reserve.

"The pasturing of woodlands is inimical to rapid extension or closer stockage of the timber growth. Any sheeping of the areas will practically destroy whatever seedling growth may spring up on such grazed-over tracts. The pasturing of horses and cattle, while destructive in a lesser degree, is less likely, if carried to excess,

to have the same effect on the seedling growth as the sheeping."

John Lieberg, 1904, in reporting upon the Absaroka Division of the Yellowstone Reserve.

"Sheepmen start fires to promote the growth of grass near the summits, believing that the destruction of the timber is generally followed by a growth of those grasses upon which the sheep will feed. Severe fires also have the effect of clearing the ground of underbrush and litter and make it easier and safer to drive sheep from point to point."-----

"There is little doubt but that sheep men have started fires, and that burns more or less extensive have resulted, but it is equally true that by reason of strict regulations and enforcement of the law, together with a regard for their own interests, due to a wholesome fear of the cancellation of their permits, the practice has ceased, and any fires now originating with the sheep men are isolated cases, resulting from carelessness."

"From my observations the injury being done the forest growth by sheeping is not serious and the attendant evils can be and are being guarded against."

Fred G. Plummer, "Report on the Mount Rainier Forest Reserve, Washington," 1900.

Four out of seventeen of the 1910 fires on the Idaho National Forests were started by sheepmen. The worst fires and by far the greatest number occurred on heavily stocked sheep districts.

"In Arizona there were no young forests of any considerable extent antedating a period of forty years, and almost all of the regrowth has sprung up during the last quarter of a century. A single exception may be noted in the White Mountains, which have been occupied for a couple of centuries by the Apache Indians. These forests show in certain localities all classes of regrowth, and are in marked contrast to the mountain country occupied by the Navajo Indians in the northeastern portion of the territory. The Navajoes have possessed sheep and goats and followed pastoral pursuits for over two centuries. The forests occupied by them show practically no regrowth."

From "Forest Fires", manuscript by Clyde Leavitt, 1908.

Mr. Gaskill in 1902 stated in reference to Forest Fires to improve pasturage: -

"The practice was commenced in the southern and western States. It is responsible for much direct loss and the practical prohibition of regrowth. There

is evidence that the practice, particularly in the sheep country, is not so prevalent as it once was."-----

"Overgrazing weakens or kills not only the herbaceous vegetation, but shrubs, seedling trees, and the smaller saplings."

Forest Service Bulletin No. 15, Colville 1898.

"This destruction is most serious on the best forest soils, since here the greatest number of seedling plants is likely to occur, and the young plans has the greatest value. In these places grazing should ultimately cease. To what extent sheep may assist in regeneration in certain forms of forests, by cleaning the surface and breaking the ground, is still uncertain."-----

"The extension of range has certainly been through fire. Without fires in the past, the range would be restricted to the Alpine parks, and the area of even these might perhaps be smaller. Every fire tends to reduce the forest and work on the side of grass and weeds."

From unsigned manuscript on file in Grazing Office, Washington, D. C., about 1906.

"As to the effect of sheep grazing upon the danger from fires on the range or in the forests, great diversity of opinion prevails. It is argued by sheepmen in the country under discussion that by preventing the grass from attaining great height and drying up in the fall in that condition, the danger from range fires is much lessened. It is maintained by sheepmen that such areas if covered only with a sod of short grass constitute a fire guard and interfere with the progress of forest fires across such areas.---"

"The extent to which these conditions offer a safeguard is still an open question." -----

"Sheep grazing drives out inflammable material. "Abundant evidence 1901, from personal observations, that forest fires may be carried across wide interruptions of the timber area without the assistance of dry grass or other forage plants, and the excessively dry condition of all material in timber areas grazed by sheep renders progress of any fire rapid and destructive."

"If dry, rotten logs, in which fires smoulder are surrounded by green vegetation in which considerable moisture is retained, the danger from them is much reduced. Forest fires in areas which have been overgrazed by sheep were observed in several places, and the progress of these fires was apparently in no way checked by the fact that the grass was eaten close to the soil. On the whole it would appear from the observations made in 1901, that the danger

from forest fires is increased rather than diminished by sheep grazing." -----

"Fires are deliberately set in the forest areas under discussion by tramp sheepmen for the purpose of driving out the cattle and so obtaining the ranges for their own use."

Cites a fire in 1900 which burned over grazing land for a distance of 15 miles. "On a part of the range thus burned over, fairly good grass was growing during the season of 1901, and sagebrush was quite destroyed. In the burned timber areas, however, there was absolutely nothing growing which could serve as forage. The cattlemen in this region considered that they had on the whole suffered a distinct and heavy loss in forage from the progress of this fire."-----

"Forest fires frequently occur in regions where tramp sheep are allowed, by the carelessness or malicious intent of the sheepherders."

Special report by E. V. Wilcox, "Grazing in the Forest Reserves around Yellowstone Park and in the Adjacent Timbered Areas." 1901.

An unsigned manuscript about 1902-3, presumably by Geo. E. Rutherford, on "Sheep Grazing in Plumas County", says,-

Sheepherders set fires to clear off the chaparral and start new shoots after the areas have been

grazed. "The advantages to them far outweigh whatever disadvantages may follow the practice." The whole discussion is distinctly adverse to sheep grazing. "In 1899 this range was found to be unable to support sheep during a summer. Lupines no longer grew in appreciable quantity, grass was nearly extinct, and birch (Blue brush), which is by far the most important feed, had been entirely wiped out within the reach of the sheep. So the sheep were removed to other ranges, presumably to let this one recover. With the departure of sheep, fires sprang up, and burned over most of the range. The departing flockmaster could very well have expected on returning in three years to find birch well sprouted from the roots and much lupine and some grass growing as a result of the fires and the flock's absence. His hopes and the results were at variance." The range was utilized by cattle - Says the range increased in carrying capacity from 100 head the year after the fire to nearly 500 head in five years; that reproduction sprang up etc. He states, - Held reforestation in check for nearly half a century on the Grizzly Creek range in Plumas County.

Says: "The sheep and forest can not be reconciled on the west slope of the northern Sierra Nevadas."
(J. H. H.)

Mr. L. H. Pammel in his contemplated "Bulletin on Grazing Conditions in the Uintah Forest Reserve" 1900,

said: "Aside from fires started by Indians, very few are caused intentionally. It is related that in 1899 a Mexican shepherd started a fire about his camp at night to protect himself from bear. This is but one instance however - ----."

"In reply to my inquiries shepherders invariably answered that they did not intentionally start fires as they did not believe that burning improved the range. In corroboration it may be mentioned that there are on record many instances where sheepmen have suffered financial loss from fires and that they are always ready to aid in extinguishing them. Most forest fires undoubtedly result from carelessness in the management of campfires. I am reliably informed that during the season of 1899 numerous fires in shepherders' camps were put out by others after the herders had left. In the course of our work in the reserve, we put out three such fires, one left by miners, - another by a fishing party, - and another left by a shepherd."

"Causes of Fires

1. Carelessness of hunters, and travelers, and stockmen.
2. From lightning.
3. Fires set for one purpose or another.

"It increases the probabilities of a fire from carelessness by bringing more people into the region who

must have camps and branding fires, and from maliciousness, by causing conflictions of interest among stockmen. Properly handled, grazing should reduce the danger of damage to forests by fire." -----

"I think it is pretty certain that sheep herders set fires to the dry grass at times as a matter of retaliation against the actions of the cowboys."

"The Indians of the White Mountain Indian Reservation in Arizona quite frequently set out fires in order to burn off the dry grass, that game may come to the first green area as soon as the grass begins to grow again. They also wish to keep down the underbrush. These fires not infrequently get over into the Gila Reserve."

Mr. E. O. Wooten, reporting upon the Gila Forest Reserve, about 1900.

California (Sierra County) 1887, August 26.

"Much feeling is manifest in this part of the country, Sierra County, California, against sheepherders who, it is believed, start most of the forest fires raging through the mountains."

San Francisco Chronicle, 1887, August 27.

From Mr. Plummer's Card Records.

To increase or "Improve" the grazing area.

"This practice has existed at one time or another in every

State. It has been claimed that the practice was inherited from the Indians, but it is certain that Europe suffered many centuries ago from the same practice."

"Unrestricted grazing of forested land beyond the forage capacity, together with the practice of burning to increase the grazing area, means the eventual destruction, not only of the forest cover and soil, but the pastoral industry. It has aptly been termed "Karsting", since it renders the land as utterly barren as was the Karst region of Austria, a condition only paralleled by the Bad Lands or Malpais of the western states."

From Forest Service Bulletin 139 (Proposed)

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The Ideal Kind of Grazing and How Attainable

"-----That branch of the Government having in hand the administration of such a permit system for sheep grazing, should be guided also by the industrial conditions of the communities covered. A region owing its present and prospective commercial success largely to grazing and little to timber supply and water supply, should be handled more liberally in the issue of permits than a region in which a continuous supply of lumber and irrigation water are of primary importance. "

"The writer is aware that the adoption of the policy above outlined is not in accord with the ideas of those whose conception of a forest reserve is identical with their conception of a National park, a place of public resort, or a game preserve. While it is feasible and proper that certain portions of the forest reserves should be maintained for such purposes, it is no less clear that the executive branch of the Government in setting aside such

large and much-used areas of the forest lands as reserves, and the legislative branch of the Government in specifying the principles under which these reserves should be managed, had chiefly in mind the preservation of these reserves for use, not from use. Rational regulation of all the resources of the reservations is their object."

Colville, 1898, Page 32, of the "Forester"
for 1898.

"The grazing of sheep and other stock upon burned areas certainly retards their restocking with timber. If stock pasturing were prohibited upon all burned and low timberless areas, until the restocking had resulted in such sufficient stands and age of timber trees that further protection would be unnecessary, it would remove a serious enemy from the field, and in all probability would result in extinguishing forest fires in their incipency."

Fred G. Plummer in his Report on the Mount Rainier Forest Reserve, Washington", 1900.

"By 'Moderate Grazing' is meant grazing only to such an extent that the forage crop does not decrease from year to year." -----

"It is certain that well marked and important changes have taken place in the aspect of whole districts

in the behavior of whole river systems and these have led thoughtful men to conclusions which are sound and well worth acting upon within due limits. But it would be serious error to draw the same conclusions from different premises. The case of the east side of the Cascades is not that of the west side or of the French or Austrian Alps. Climate and soil being radically different, it is but reasonable to suppose that the effects of grazing will not be the same. The east side of the Cascades is not a densely forested area in danger of being deforested in the near future; it is a sadly deforested, fire-damaged wilderness where the future will see more forests and better forests. Whatever beneficial effects are derived from the forest cover, these good effects are on the increase and not on the decrease, for the greatest enemy of the woods, - the fire, - has already been restricted, and there is every reason to believe that it will be more and more so in time to come." -----

"But since grass has become valuable and has had to be husbanded, as it is now, neither cattlemen nor sheepmen can afford this kind of cleaning process, and there are already signs in most of those park woods (about 1900), of the grass becoming buried by litter and of the young pine thickets converting the park woods into forest."

From an old manuscript in the Office of Grazing, Washington, D. C. about 1908.

Mr. S. J. Halsinger, Special Agent, General Land Office, in a letter to Mr. Pinchot, September 6, 1900, from Phoenix, Arizona, says:

"Every locality has conditions peculiar to itself. In some I have found strong tendencies to reforestation, while in other localities not a single young tree growing. My observation leads me to the conviction that even in these semi-arid forest districts, where trees now are growing, reforestation will occur in time ----, ranging sheep on such districts would lessen the chances of a new forest growth, while pasturing a district where young pines germinate and grow annually might protect the new forest from utter destruction by forest fires. ----- I can see no reason why sheep should at this time be driven from forest reserves where the area does not affect irrigation. ----- A great portion of the San Francisco Mountains, (Arizona), are admirably adapted for sheep grazing. The rocky surface prevents the sheep from cutting up the soil and destroying the grass as in many places on the Black Mesa.

Marked examples of this (breaking up soil), are to be seen on White Mountains in southeastern New Mexico, (This is limestone formation). The Mescalero Indian Reservation covers one-half of that mountain, while the other half is open, public domain. ----- The tops of the mountains and slopes form vast meadows. On the Mescalero side

these meadows are moderately pastured by 10,000 sheep belonging to the Indians. The mountain floors are unbroken. On the north sides occupied by the general public there are over 20,000 head of sheep. The grass is eaten to the earth."

"But similar conditions are to be found both in Arizona and New Mexico on cattle ranges. Ranges that supported 50 to 100,000 cattle ten years ago produce little more than weeds at the present time and would not support one tenth that number of cattle -----".

Believes through Government regulations the industry should be consistently fostered.

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Foreign and Miscellaneous

(The foreign references will include "Benefits and Drawbacks").

"Lightning ranks second only to sparks from locomotives as a source of conflagration."

Forest Service Bulletin No. 111.

"Since the earliest times when forests were managed with a view to game preservation, to the present era when the forests are managed with a view to financial return, the grazing question has always been a matter of discussion and legislation. In England sheep are not 'beasts of common' in the eye of the law and therefore can have no right over waste land which other animals may enjoy. This was brought about from the fact that deer would not feed after sheep."

"In the central provinces of the Bhandara division, southern circle central provinces where forest administration and protection is comparatively recent, and is carried out with a direct financial object, grazing is only allowed as a privilege and as a general rule the grazing of goats in reserved forests is prohibited."

"Only within the last fifteen years has grazing been limited to areas where they could do the least harm. The above observations are based upon

(a) Forests upon which no felling of green wood has been allowed for sixteen years but upon which grazing has been permitted.

(b) Forests upon which improvement fellings in high forests of the nature of clearings have been made, but upon which no grazing has been allowed for the last eleven years, and

(c) Forests worked under coppice with standards open ordinarily to grazing, but closed for ten years after fellings have been carried out."

"Reproduction here is patchy and where protected by thorny growth in heavily grazed forests cattle use more the level ground."

"An interesting condition in connection with the heavily grazed Morgali Circle in Bananthari range is that of the southern portion, so heavily grazed no danger from fire because nothing to burn. This northern portion

is favored by cattle grazing, not only through forming its most valuable species, but by the natural fire protection afforded by heavy grazing to the south. Similar conditions exist elsewhere.

Above from proceedings of a Forest Conference, and paper by J. W. Best on "Influence of Protection from Cattle Grazing," 1908.

"Can not be denied that grazing is hurtful to forest reproduction, and that the damage done is only a matter of degree, and that more especially regeneration is quite incompatible with the grazing of goats and other browsers. It is also beyond question that incalculable harm, and frequently almost incurable damage, has been done by grazing, especially of goats, in the lower hills from which small streams and rivulets debruch direct on cultivable lands below." -----

"In the Central Provinces, also, the increased demand for grazing in forest reserves forms a large portion of the forest revenue and here it is found that the exclusion from grazing without resorting to fire protecting at the same time, serves no practical end, for, though reproduction takes place, a dense crop of grass almost immediately covers the ground and conflagrations, which are the order of the day, sweep everything cleaner than it was before." -----

"Fire protection and closure against grazing here, on several occasions of fodder famine, proved a great boon to the country and saved the lives of many thousands of cattle."-----

"The cheapest way of securing continuity of the forests must, as a rule, be adopted, though an increased expenditure would frequently secure more rapid returns." ----- "All we can, in the majority of cases, succeed in doing, is to protect our forests as much as possible from fire, grazing, and other hurtful interference, and to exploit them in such manner as to give natural reproduction the best possible chance, and to assist the regeneration of the natural forest by such silvicultural measures as the circumstances of each case may demand. Such measures, under my interpretation of the word "Silviculture" include all the artificial help to effect the natural regeneration of the forests, as well as their after treatment, in so far as this has the improvement of the ~~pur~~plement in view."-----
ew

"The tree is most grateful for fire protection and protection against grazing and it may be confidently asserted that the harvest of the future will be a much richer one than has ever hitherto been reached and infinitely superior to that which the Department has gathered from many half-removed forests."-----

From "Forestry in British India" by B. Ribbentrop, 1900, who had spent 33 years in the Indian Forest Service.

There is no data on grazing and fire damage in "Stock Ranges in Northwestern California" by Joseph Burt Davy.

Various reasons have been given for the serious fires of 1910, among them,-

1. Lack of sufficient patrol.
2. Lack of sufficient trails and telephone lines.
3. Too early opening of the game season.
4. Lack of proper insistence that permittees comply with the terms of their permits.

The remedies suggested are,-

1. Fire supply boxes.
2. Publicity and education.
3. Warnings,
4. Camp fire permits.
5. Bonding of fire nuisances.
6. Strict enforcement of regulations.

Forest fires are dependent upon certain factors.

1. Humidity.
2. Air currents and clouds.
3. Soil and humus.
4. Undergrowth.
5. Type of forest land.
6. Lesser factors, as dripping moss in trees, resin, blisters, pitch seams, etc.
7. Topography.

"Of a total of 2503 fires in the National Forests, 1906-1907, 641 caused by railroad locomotives, 638 by campers, 458 by lightning, 49 cleaning and burning brush, 43 incendiary, 22 hunters, 652 miscellaneous."

From Mr. Leavitt's "Forest Fires" paper 1908.

"The principal objects sought to be gained by these (southern) fires are (a) Protection of turpentine by burning all combustible material at the time of year when it will cause the least injury to the naval stores industry."----- (b) To improve the range. (c) To protect fences and crops by burning the combustible material on surrounding areas. (d) To keep down reproduction and undergrowth and render the woods easy of access at all times."

From Mr. Leavitt's "Forest Fires" paper 1908.

"It has long been the tenet of German and other text-books on forestry, and grazing, particularly goat and sheep grazing, and forestry are incompatible.

(1) But there is not a single district in Germany, Great Britain, France, or Switzerland, which combines the configuration, soil, and climate of the Cascades. Nor is there anything in those lands to compare with our range-stock industries. It is perfectly safe to say that if they had pastures like those of the Washington and Rainier

reserves, together with their own extensive, low-plain winter ranges, every spear of grass would be utilized, and not one acre would be closed to grazing until full arrangements had been made to restock the area or otherwise put it to better use.

"The forest administration of India, which has accomplished so much during the last 30 (40) years, has wrestled with this problem successfully, and its position is therefore even more instructive than European experience."

"Mr. B. Ribbentrop, Inspector General of the Forests to the Government of India, says,- 'In the Central provinces, also, the income derived from grazing in the forest reserves forms a large portion of the forest revenue, and here it is found that the exclusion from grazing without resorting to fire - protecting at the same time - serves no practical end, for, though reproduction takes place, a dense crop of grass almost immediately covers the ground; and conflagrations, which are the order of the day, sweep everything cleaner than it was before.'-----"

From an unsigned manuscript on file in the Office of Grazing, Washington, D. C. About 1908.

"Sheep injure range more after fires than before. In 1901 fires most frequent along roadways which were used by tourists."

"At least five herders killed in conflicts between sheep and cattle men in this country in 1901 and many head of sheep and cattle."

From Special Report by E. V. Wilcox, "Grazing in the Forest Reserves Around Yellowstone Park and in the Adjacent Timbered Areas." 1901.

"Fires occurring in the open only burn off the dry grass and kill but very few of the perrenials. In low, scrubby timber very little damage is done on account of scantiness of combustible material. In the pine forests if there be a 'good stand' of dry grass, fire of course burns all this and also kills the young trees, both oak and pine. Pine trees over 25 years of age are but slightly affected, except where old tops of fallen trees or resinous logs make the fire more intense."-----

"Thus the effects of burns are (1) In the open, little damage but loss of dry hay for the season; (2) In pine forests, loss of dry hay, most of underbrush, all young pines and some old ones; (3) In spruce forests, practically complete destruction."

E. O. Worten reporting upon the Gila Forest Reserve about 1900.

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Forst und Landwirtschaft

Die Korkeiche,.....Portugal

Dr. Klein, - Madeira, p. 553.

Extract - The ground under the oaks is generally cultivated and kept free from underwood and tangled vegetation. ---- Keeping the soil clean also acts as a protection against fire and makes it easier for the swine grazing there in the mast season to find the acorns.

"In many parts of India with the increase in the numbers and the prosperity of the local population in recent years, the number of cattle for which grazing is required in the Government forests has steadily risen and the question of what measures are to be taken in order to fill as far as possible the urgent needs of the people with regard to fodder and grazing, without thereby unduly decreasing the area required for the satisfaction of the wants of the country in respect to wood, fuel, and other forest products, for the protection of the headwaters of streams and for improving the water supply required for cultivated tracts, is now one of great difficulty and pressing importance."

"In whatever way a solution of the question of a satisfactory allotment of forest areas for these agricultural interests is ultimately arrived at, it appears

certain that large areas of the greatest value as grazing ground or as areas productive of good fodder grass to meet present needs or serve as a reserve in time of famine, will always be set within the boundaries of the Government forests, and such areas will consequently remain under the management of the Forest Department. It is also clear that with regard to such areas, the forest estate will not satisfactorily fulfil its task of satisfying to the full extent of its possibilities, the needs of the people in respect to the produce which it is capable of yielding, until these grass lands are managed in such a way as to make them most productive of the best class of articles required from them, i. e., until they are made to yield the maximum quantity of the best fodder grass which they are capable of producing."

From "Botany Series of Indian Forest Memoirs",
Vol. 1, Part 1, 1911, R. S. Hole, Imperial Forest Service.

-----"The simplest method of obtaining grasslands was to burn down the low forests. Therefore fire was placed to trees after tree of the wide-spreading oak, linden, poplar, and other hardwood species, and on the devastated, fertile soil, out of the grass seed existing there, a luxuriant grassy meadow developed under the influence of the unobstructed sunlight. As the occupation of cattle-raising increased in proportion, the mixed oak forest receded farther from the intermediate ranges.

Meadow and pastures intersperced by huts and stables took their place and where formerly wild pigs devoured the acorns under the oak trees, tame cattle and goats grazed on the rich tracts."

From an article written about 1865 "Alpine Grazing in the Tyrol" by Anten von Kerner, translated from the German.

-----"The damage would be merely relative if the grazing and hoofs of the animals were the only cause of the deterioration of the tracts, but the method of grazing to which Corsica is subjected is followed by another evil, that of jungle and forest fires. These fires are the logical and fatal results of the methods of grazing practiced in Corsica. The pastures, whatever their condition, are never restored, but each day and each year lead to more complete ruin. The shepherd, as I have said, thinks only of his flocks and originates, for the purpose of obtaining new pastures, either directly or indirectly the numerous fires which have ravaged Corsica in every sense.

The primitive methods followed in Corsica, the combination of grazing and fires, are ruining the country. As far as the ax is concerned--and it has something to do with it--it at least helps to keep tract of the damage, perhaps irretrievable, which has been done.

This damage does not date from yesterday but from far back, and has its origin in the life of the Island itself, for like all primitive people, the inhabitants have gained their living principally from grazing. It is only gradually that civilization penetrating the island has introduced other branches of human activity.-----"

-----"The grazing method, which is the cause of this disorder, provokes forest fires, unbalances natural production, causes the vegetal soil to disappear on these immense mountainous tracts spreading desolation everywhere, has come down to us. Corsica still submits to it. Besides, the evil increases daily. The demands of modern living incite the shepherd to further abuses.

Nature shows everywhere an infinite lassitude and one can not help seeing that the forest, arch of the economic edifice of the country, is becoming more limited in area before the invasions of grazing flocks and forest fires.

The problem of forest and pasture regeneration in Corsica faces us today in a brutal fashion almost incapable of elucidation. To put off the solution of this double problem would be a serious mistake.---

-----"Impoverished tracts are found on which appear only euphorbiaceae and rock-rose, which could be easily improved by active fertilizers and judicious irrigation. Tracts partially denuded by grazing could be changed into forest if

protected from stock and fires by which they are annually
devastated. To do this the important question of grazing
must be solved.-----"

Societe Forestiere de Franche-Comte et Belfort,
December, 1912. "La Regime Pastoral de la Corse" by
Lucien Gerod-Genet.

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